

What is claimed is:

1. A method of preventing damage by a pest to shoots and foliage of a plant grown from a seed, the method comprising treating the seed of a plant that is selected from the group consisting of corn, soybean, cotton, rice, sorghum, wheat, barley, rye, sunflower, tomato, sugarcane, tobacco, rape and oats with a composition comprising at least one pyrethrin or synthetic pyrethroid having a vapor pressure that is lower than that of tefluthrin at a rate that is equal to or greater than 88 grams of the pyrethrin or synthetic pyrethroid per 100 kilograms of the seed, wherein, if 5 the seed is treated with a pesticide in addition to the pyrethrin or synthetic pyrethroid, the additional pesticide is added as a part of the composition along with the pyrethrin or synthetic pyrethroid.
2. The method as set forth in claim 1, wherein the synthetic pyrethroid is selected from the group consisting of (s)-cyano(3-phenoxyphenyl)methyl 4-chloro alpha (l-methylethyl)benzeneacetate (fenvalerate); (S)-cyano (3-phenoxyphenyl) methyl (S)-4-chloro-alpha-(1-methylethyl) benzeneacetate (esfenvalerate); (3-phenoxyphenyl)-methyl(+)-cis-trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate (permethrin); (\pm) alpha-cyano-(3-phenoxyphenyl) methyl(+)-cis,trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane carboxylate (cypermethrin); beta-cypermethrin; theta cypermethrin; S-cyano (3-phenoxyphenyl) methyl (\pm) cis/trans 3-(2,2-dichloroethenyl) 2,2 dimethylcyclopropane carboxylate (zeta-cypermethrin); (s)-alpha-cyano-3-phenoxybenzyl (IR,3R)-3-(2,2-dibromovinyl)-2,2-dimethyl cyclopropanecarboxylate (deltamethrin); alpha-cyano-3-phenoxybenzyl 2,2,3,3,-tetramethyl cyclopropoanecarboxylate (fenpropothrin); (RS)-alpha-cyano-3-phenoxybenzyl(R)-2-[2-chloro-4-(trifluoromethyl)anilino]-3-methylbutanoate (tau-fluvalinate); (\pm)-cyano (3-phenoxyphenyl) methyl (\pm)-4-(difluoromethoxy)-alpha-(1-methyl ethyl)benzeneacetate (flucythrinate); cyano(4-fluoro-3-phenoxyphenyl)methyl 3-[2-chloro-2-(4-chlorophenyl)ethenyl]-2,2-dimethylcyclopropanecarboxylate (flumethrin); cyano(4-fluoro-3-phenoxyphenyl) methyl 3-(2,2-

dichloroethyl)-2,2-dimethyl-cyclopropanedcarboxylate (cyfluthrin); beta cyfluthrin; transfluthrin; (S)-alpha-cyano-3-phenoxybenzyl(Z)-(IR-cis)-2,2-dimethyl-3-[2-(2,2,2-trifluoro-trifluoromethyl-ethoxycarbonyl)vinyl]cyclopropane carboxylate (acrinathrin); (IR cis) S and (IS cis) R enantiomer isomer pair of alpha-cyano-3-phenoxybenzyl-3-(2,2dichlorovinyl)-2,2-dimethylcyclopropane carboxylate (alphacypermethrin); [IR,3S)3(1'RS)(1',2',2',2'-tetrabromoethyl)]-2,2-dimethyl cyclopropanecarboxylic acid (s)-alpha-cyano-3-phenoxybenzyl ester (tralomethrin); cyano-(3-phenoxyphenyl) methyl 2,2-dichloro-1-(4-ethoxyphenyl)cyclopropane carboxylate (cycloprothrin); [1 α , 3 α (Z)]-(\pm)-cyano-(3-phenoxyphenyl)methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-cimethylcyclopropanecarboxylate (cyhalothrin); [1 alpha (s), 3 alpha(z)]-cyano(3-phenoxyphenyl) methyl-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropane carboxylate (λ cyhalothrin); (2-methyl [1,1'-biphenyl]-3-yl) methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate (bifenthrin); 5-1-benzyl-3-furylmethyl-d-cis(1R,3S,E)2,2-dimethyl-3-(2-oxo,-2,2,4,5 tetrahydro thiophenylidenemethyl)cyclopropane carboxylate (kadethrin, RU15525); [5-(phenyl methyl)-3-furanyl]-3-furanyl 2,2-dimethyl-3-(2-methyl-1-propenyl) cyclopropane carboxylate (resmethrin); (1R-trans)-[5-(phenylmethyl)-3-furanyl]methyl 2,2-dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylate (bioresmethrin); 3,4,5,6-tetra hydrophthalimidomethyl-(IRS)-cis-trans-chrysanthemate (tetramethrin); 3-phenoxybenzyl-d,l-cis,trans 2,2-dimethyl-3-(2-methylpropenyl) cyclopropane carboxylate (phenothrin); cyphenothrin; prallethrin; imiprothrin; (RS)-3-allyl-2-methyl-4-oxycyclopent-2-enyl-(1A,3R; 1R,3S)-2,2-dimethyl-3- (2-methylprop-1-enyl) cyclopropane carboxylate (allethrin); ZXI 8901; and mixtures thereof.

3. The method as set forth in claim 1, wherein the synthetic pyrethroid is selected from the group consisting of λ cyhalothrin, bifenthrin and permethrin.

4. The method as set forth in claim 1, wherein the pyrethrin or synthetic pyrethroid is one having a water solubility that is less than about 0.02 mg/l (20°C) and/or a vapor pressure of less than about 8 mPa (20°C).

5. The method as set forth in claim 1, wherein the pyrethrin or synthetic pyrethroid is one having a water solubility that is less than about 0.015 mg/l (20°C) and/or a vapor pressure of less than about 6 mPa (20°C).

10. 6. A seed of a plant that is selected from the group consisting of corn, soybean, cotton, rice, sorghum, wheat, barley, rye, sunflower, tomato, sugarcane, tobacco and oats having adhered thereto at least one pyrethrin or synthetic pyrethroid having activity against at least one pest and having a vapor pressure that is lower than that of tefluthrin at a rate that is equal to or greater than 88 grams of the pyrethrin or synthetic pyrethroid per 100 kilograms of the seed, wherein, if the seed is treated 15 with a pesticide in addition to the pyrethrin or synthetic pyrethroid, the additional pesticide is added as a part of the composition along with the pyrethrin or synthetic pyrethroid.

7. The seed as set forth in claim 6, wherein the seed is selected from the group consisting of corn, soybean and cotton seed.

20. 8. The seed as set forth in claim 6, wherein the seed is corn seed.

9. The method according to claim 1, comprising treating a seed having at least one heterologous gene encoding for the expression of a protein that is active against a first pest, with a composition comprising at 25 least one pyrethrin or synthetic pyrethroid having activity against at least one second pest.

10. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is a water-insoluble, non-volatile pyrethrin or synthetic pyrethroid.

30. 11. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is one having a water solubility of not over 10 mg/l at 20°C.

12. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is one having a water solubility of not over 1 mg/l at 20°C.

5 13. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is one having a water solubility of not over 0.018 mg/l at 20°C.

14. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is one having a water solubility of not over 0.01 mg/l at 20°C.

10 15. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is one having a vapor pressure of not over 6 mPa at 20°C.

16. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is one having a vapor pressure of not over 1 mPa at 20°C.

15 17. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is pyrethrin.

18. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is a synthetic pyrethroid.

20 19. The method as set forth in claim 9, wherein the synthetic pyrethroid is selected from the group consisting of (S)-cyano(3-phenoxyphenyl)methyl 4-chloro alpha (l-methylethyl)benzeneacetate (fenvalerate); (S)-cyano (3-phenoxyphenyl) methyl (S)-4-chloro-alpha-(1-methylethyl) benzeneacetate (esfenvalerate); (3-phenoxyphenyl)-

25 methyl(+)-cis-trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate (permethrin); (\pm) alpha-cyano-(3-phenoxyphenyl) methyl(+)-cis,trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane carboxylate (cypermethrin); beta-cypermethrin; theta-cypermethrin; S-cyano (3-phenoxyphenyl) methyl (\pm) cis/trans 3-(2,2-

30 dichloroethenyl) 2,2 dimethylcyclopropane carboxylate (zeta-cypermethrin); (S)-alpha-cyano-3-phenoxybenzyl (IR,3R)-3-(2,2-dibromovinyl)-2,2-dimethyl cyclopropanecarboxylate (deltamethrin); alpha-

cyano-3-phenoxybenzyl 2,2,3,3,-tetramethyl cyclopropoanecarboxylate (fenpropathrin); (RS)-alpha-cyano-3-phenoxybenzyl(R)-2-[2-chloro-4-(trifluoromethyl)anilino]-3-methylbutanoate (tau-fluvalinate); (\pm)-cyano (3-phenoxyphenyl) methyl (\pm)-4-(difluoromethoxy)-alpha-(1-methyl ethyl)
5 benzeneacetate (flucythrinate); cyano(4-fluoro-3-phenoxyphenyl)methyl 3-[2-chloro-2-(4-chlorophenyl)ethenyl]-2,2-dimethylcyclopropanecarboxylate (flumethrin); cyano(4-fluoro-3-phenoxyphenyl) methyl 3-(2,2-dichloroethenyl)-2,2-dimethyl-cyclopropanedcarboxylate (cyfluthrin); beta
10 cyfluthrin; transfluthrin; (S)-alpha-cyano-3-phenoxybenzyl(Z)-(IR-cis)-2,2-dimethyl-3-[2-(2,2,2-trifluoro-trifluoromethyl-
ethoxycarbonyl)vinyl]cyclopropane carboxylate (acrinathrin); (IR cis) S and
(IS cis) R enantiomer isomer pair of alpha-cyano-3-phenoxybenzyl-3-(2,2dichlorovinyl)-2,2-dimethylcyclopropane carboxylate
(alphacypermethrin); [IR,3S]3(1'RS)(1',2',2',2'-tetrabromoethyl)]-2,2-
15 dimethyl cyclopropanecarboxylic acid (s)-alpha-cyano-3-phenoxybenzyl ester (tralomethrin); cyano-(3-phenoxyphenyl) methyl 2,2-dichloro-1-(4-ethoxyphenyl)cyclopropane carboxylate (cycloprothrin); [1 α , 3 α (Z)]- (\pm) -cyano-(3-phenoxyphenyl)methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-cimethylcyclopropanecarboxylate (cyhalothrin); [1 alpha (s), 3 alpha(z)]-
20 cyano(3-phenoxyphenyl) methyl-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropane carboxylate (lambda cyhalothrin); (2-methyl [1,1'-biphenyl]-3-yl) methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate (bifenthrin); 5-1-benzyl-3-furylmethyl-d-cis(1R,3S,E)2,2-dimethyl-3-(2-oxo,-2,2,4,5 tetrahydro
25 thiophenylidenemethyl)cyclopropane carboxylate (kadethrin, RU15525); [5-(phenyl methyl)-3-furanyl]-3-furanyl 2,2-dimethyl-3-(2-methyl-1-propenyl) cyclopropane carboxylate (resmethrin); (1R-trans)-[5-(phenylmethyl)-3-furanyl]methyl 2,2-dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylate (bioresmethrin); 3,4,5,6-tetra hydro-
30 phthalimidomethyl-(IRS)-cis-trans-chrysanthemate (tetramethrin); 3-phenoxybenzyl-d,l-cis,trans 2,2-dimethyl-3-(2-methylpropenyl)cyclopropane carboxylate (phenothrin); cyphenothrin; prallethrin;

imiprothrin; (RS)-3-allyl-2-methyl-4-oxycyclopent-2-enyl-(1A,3R; 1R,3S)-2,2-dimethyl-3- (2-methylprop-1-enyl) cyclopropane carboxylate (allethrin); ZXI 8901; and mixtures thereof.

20. The method as set forth in claim 9, wherein the synthetic pyrethroid is selected from the group consisting of lambda cyhalothrin, bifenthrin and permethrin.
21. The method as set forth in claim 9, wherein the synthetic pyrethroid is lambda cyhalothrin.
- 10 22. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is selected on the basis of its pesticidal activity against a pest that is different from the first pest.
- 15 23. The method as set forth in claim 9, wherein the pyrethrin or synthetic pyrethroid is selected on the basis of its activity in preventing damage to the shoots and foliage of the plant by an insect.
24. The method as set forth in claim 9, wherein the insect is a larval form of a *Lepidopteran sp.* insect.
25. The method as set forth in claim 1, wherein the insect is a cutworm.
- 20 26. The method as set forth in claim 25, wherein preventing damage to the shoots and foliage of the plant comprises reducing the damage caused by cutworms to treated plants by a significant amount over the damage caused by cutworms to untreated plants of the same type under the same conditions.
- 25 27. The method as set forth in claim 26, wherein the degree of reduction of the damage as a result of the treatment is substantially total prevention of damage.
- 30 28. The seed according to claim 6, comprising at least one heterologous gene encoding for the expression of a protein that is active against a first pest, the seed having adhered thereto at least one pyrethrin or synthetic pyrethroid having activity against at least one second pest.
29. The seed as set forth in claim 28, wherein the seed is selected from the group consisting of corn, soybean and cotton seed.

30. The seed as set forth in claim 29, wherein the seed is corn seed.
31. The seed as set forth in claim 28, wherein the at least one heterologous gene encodes for the expression of a protein that is insecticidally active.
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32. The seed as set forth in claim 31, wherein the gene is one originally derived from a microorganism selected from the group consisting of *Bacillus*, *Rhizobium*, *Pseudomonas*, *Serratia*, *Trichoderma*, *Glomus*, *Gliocladium* and mycorrhizal fungi.
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33. The seed as set forth in claim 32, wherein the protein is active against corn root worm.
34. The seed as set forth in claim 32, wherein the protein is active against european corn borer.
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35. The seed as set forth in claim 28, wherein the synthetic pyrethroid is selected from the group consisting of (s)-cyano(3-phenoxyphenyl)methyl 4-chloro alpha (l-methylethyl)benzeneacetate (fenvalerate); (S)-cyano (3-phenoxyphenyl) methyl (S)-4-chloro-alpha-(1-methylethyl) benzeneacetate (esfenvalerate); (3-phenoxyphenyl)-methyl(+)-cis-trans-3-(2,2-dichoroethenyl)-2,2-
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- dimethylcyclopropanecarboxylate (permethrin); (\pm) alpha-cyano-(3-phenoxyphenyl) methyl(+)-cis,trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane carboxylate (cypermethrin); beta-cypermethrin; theta cypermethrin; S-cyano (3-phenoxyphenyl) methyl (\pm) cis/trans 3-(2,2-dichloroethenyl) 2,2 dimethylcyclopropane carboxylate (zeta-cypermethrin); (s)-alpha-cyano-3-phenoxybenzyl (IR,3R)-3-(2,2-dibromovinyl)-2,2-dimethyl cyclopropanecarboxylate (deltamethrin); alpha-cyano-3-phenoxybenzyl 2,2,3,3,-tetramethyl cyclopropoanecarboxylate (fenpropathrin); (RS)-alpha-cyano-3-phenoxybenzyl(R)-2-[2-chloro-4-(trifluoromethyl)anilino]-3-methylbutanoate (tau-fluvalinate); (\pm)-cyano (3-phenoxyphenyl) methyl (\pm)-4-(difluoromethoxy)-alpha-(1-methyl ethyl) benzeneacetate (flucythrinate); cyano(4-fluoro-3-phenoxyphenyl)methyl 3-[2-chloro-2-(4-chlorophenyl)ethenyl]-2,2-dimethylcyclopropanecarboxylate
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- (flumethrin); cyano(4-fluoro-3-phenoxyphenyl) methyl 3-(2,2-dichloroethyl)-2,2-dimethyl-cyclopropanedcarboxylate (cyfluthrin); beta cyfluthrin; transfluthrin; (S)-alpha-cyano-3-phenoxybenzyl(Z)-(IR-cis)-2,2-dimethyl-3-[2-(2,2,2-trifluoro-trifluoromethyl-
- 5 ethoxycarbonyl)vinyl]cyclopropane carboxylate (acrinathrin); (IR cis) S and (IS cis) R enantiomer isomer pair of alpha-cyano-3-phenoxybenzyl-3-(2,2dichlorovinyl)-2,2-dimethylcyclopropane carboxylate (alphacypermethrin); [IR,3S]3(1'RS)(1',2',2',2'-tetrabromoethyl)]-2,2-dimethyl cyclopropanecarboxylic acid (s)-alpha-cyano-3-phenoxybenzyl
- 10 ester (tralomethrin); cyano-(3-phenoxyphenyl) methyl 2,2-dichloro-1-(4-ethoxyphenyl)cyclopropane carboxylate (cycloprothrin); [1 α , 3 α (Z)]-(\pm)-cyano-(3-phenoxyphenyl)methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-cimethylcyclopropanecarboxylate (cyhalothrin); [1 alpha (s), 3 alpha(z)]-cyano(3-phenoxyphenyl) methyl-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropane carboxylate (lambda cyhalothrin); (2-methyl [1,1'-biphenyl]-3-yl) methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate (bifenthrin); 5-1-benzyl-3-furylmethyl-d-cis(1R,3S,E)2,2-dimethyl-3-(2-oxo,-2,2,4,5 tetrahydro thiophenylidenemethyl)cyclopropane carboxylate (kadethrin, RU15525);
- 15 [5-(phenyl methyl)-3-furanyl]-3-furanyl 2,2-dimethyl-3-(2-methyl-1-propenyl) cyclopropane carboxylate (resmethrin); (1R-trans)-[5-(phenylmethyl)-3-furanyl]methyl 2,2-dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylate (bioresmethrin); 3,4,5,6-tetra hydrophthalimidomethyl-(IRS)-cis-trans-chrysanthemate (tetramethrin); 3-
- 20 phenoxybenzyl-d,l-cis,trans 2,2-dimethyl-3-(2-methylpropenyl)cyclopropane carboxylate (phenothrin); cyphenothrin; prallethrin; imiprothrin; (RS)-3-allyl-2-methyl-4-oxycyclopent-2-enyl-(1A,3R; 1R,3S)-2,2-dimethyl-3-(2-methylprop-1-enyl) cyclopropane carboxylate (allethrin); ZXI 8901; and mixtures thereof.
- 25 36. The method according to claim 1, wherein the composition is added as a suspension, emulsion, or slurry of particles in an aqueous medium.

37. The method according to claim 1, wherein the pyrethrin or synthetic pyrethroid is added in an amount of at least 125 grams per 100 kilograms of the seed.